

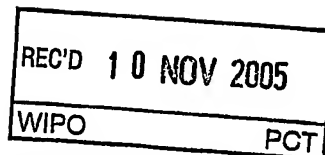
# PATENT COOPERATION TREATY


## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference LU6132	<b>FOR FURTHER ACTION</b>		See Form PCT/PEA/416
International application No. PCT/EP2004/010375	International filing date (day/month/year) 16.09.2004	Priority date (day/month/year) 24.09.2003	
International Patent Classification (IPC) or national classification and IPC B01J19/18, C08F2/01			
Applicant BASELL POLYOLEFINE GMBH et al.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 2 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input checked="" type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand  14.06.2005		Date of completion of this report  09.11.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer  Thomasson, P  Telephone No. +49 89 2399-8339	

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**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/EP2004/010375

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

**Description, Pages**

1-13 as originally filed

**Claims, Numbers**

1-10 received on 14.06.2005 with letter of 09.06.2005

**Drawings, Sheets**

1/1 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/EP2004/010375

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	2
	No: Claims	1, 3-10
Inventive step (IS)	Yes: Claims	
	No: Claims	1-10
Industrial applicability (IA)	Yes: Claims	1-10
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

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**Box No. VI Certain documents cited**

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1. Certain published documents (Rule 70.10)

and /or

2. Non-written disclosures (Rule 70.9)

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

1. Reference is made to the following documents:

D1: GB-A-1 482 148 (MONTEDISON SPA) 3 August 1977 (1977-08-03)

D2: DE 905 547 C (BATAAFSCHE PETROLEUM) 4 March 1954 (1954-03-04)

2. The present application does not meet the requirement of Article 33(2) PCT for the following reasons:

- 2.1 D1 discloses a process for polymerization of at least one olefinic monomer; e. g. **ethylene, propylene, 1-butene** (see D1: page 1, lines 36-51). The attention of the applicant is drawn to the fact that the wording of claim 1 "a process for polymerizing at least one olefinic monomer selected from the group comprising ethylene, propylene, 1-butene" does not exclude that these monomers are **co-polymerized** with other monomers, e. g. some vinyl monomers, as this is the case in D1. This is also what the applicant intends to do (see the description of the present application on page 4, lines 15-22 and on page 4, line 36 - page 5, line 3). The polymerization may be carried out in suspension and includes solid products within the reaction mixture (see D1: page 1, lines 80-83 and page 3, lines 76-91).

Furthermore the process according to D1 uses a loop reactor at temperatures between 20 to 150°C and pressures between 5 to 100 bar (see D1: International Search Report) wherein the loop reactor comprises a cyclic reactor tube with at least one widening and narrowing in a region other than that of the axial pump (see D1: figure 1; different diameters of the horizontal and vertical legs).

Although not explicitly disclosed in D1 it is clear, with regard to the drawings, that the diameter variation of the cyclic reactor tube is of at least 10 %. Furthermore some **polymerization catalysts** are used in the process of D1 (see D1: page 1, lines 66-74 and page 2, lines 3-7).

- 2.2 D2 discloses a loop reactor comprising a cyclic reactor tube with at least one widening and narrowing in a region other than that of the axial pump (see D2: figure 4). Although

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

International application No.

PCT/EP2004/010375

not explicitly disclosed in D2 it is also clear, with regard to the drawings, that the diameter variation of the cyclic reactor tube is of at least 10 %.

Therefore the subject-matter of claims 1 and 9 is not novel.

3. The technical features of claims 2-8 and 10 are either known from D1 or D2 or are considered to be merely one of several possibilities which the skilled person would select, in accordance with the circumstances, without the exercise of inventive skill. Consequently these claims do not meet the requirement of Article 33(3) PCT.

**Re Item VI**

**Certain documents cited**

**Certain published documents**

Application No Patent No	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
WO2004/026463	01/04/2004	23/09/2003	23/09/2002

**Additional observations:**

**Claim 4:** □-olefin should be read  $\alpha$ -olefin (see originally filed claim 4).

We claim:

1. A process for polymerizing at least one olefinic monomer selected from the group comprising ethylene, propylene, 1-butene in a loop reactor in the presence of a polymerization catalyst at from 20 to 150°C, but below the melting point of the polymer to be formed, and a pressure of from 5 to 100 bar, where the polymer formed is present in a suspension in a liquid or supercritical suspension medium and this suspension is circulated by means of an axial pump, wherein the loop reactor comprises a cyclic reactor tube whose diameter varies by at least 10%, based on the predominant reactor tube diameter, and in which there is at least one widening and narrowing in a region other than that of the axial pump.
2. A polymerization process as claimed in claim 1, wherein the polymerization is carried out at an average solids concentration in the reactor of more than 53% by weight, based on the total mass of the contents of the reactor, in the case of continuous product discharge and at an average solids concentration in the reactor of more than 45% by weight, based on the total mass of the contents of the reactor, in the case of discontinuous product discharge.
3. A process as claimed in claim 1 or 2, wherein there is an additional widening and narrowing of the reactor tube in the region of the axial pump.
4. A process as claimed in any of the preceding claims, wherein ethylene is used as monomer and at least one  $\alpha$ -olefin having from 3 to 8 carbon atoms is used as comonomer.
5. A process as claimed in any of the preceding claims, wherein at least one olefinic monomer is fed in at at least 2 points along the reactor tube.
6. A process as claimed in any of the preceding claims, wherein the polymer formed is discharged continuously from the reactor.
7. A process as claimed in any of the preceding claims, wherein the polymerization is carried out at an ethylene concentration of at least 10 mol%, based on the suspension medium.
8. A process for polymerizing at least one olefinic monomer in a loop reactor as claimed in any of the preceding claims, wherein the polymerization in this loop reactor is preceded or followed by at least one further polymerization step in a loop reactor or a gas-phase reactor.

9. A loop reactor for the polymerization of olefinic monomers which comprises a cyclic reactor tube and an axial pump for conveying the polymerization mixture, wherein the diameter of the cyclic reactor tube varies by at least 10%, based on the predominant reactor tube diameter, and there is at least one widening and narrowing in a region other than that of the axial pump.

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10. A loop reactor as claimed in claim 9, wherein facilities for feeding monomers into the reactor tube are located at at least 2 points.

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